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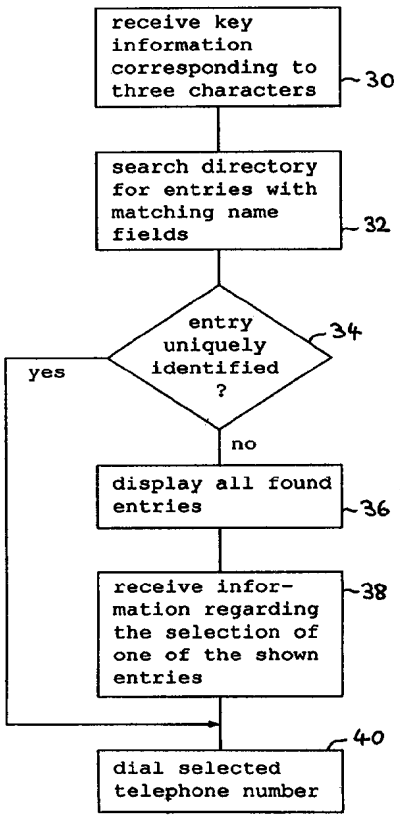
(54) Title: COMMUNICATION APPARATUS AND METHOD FOR LOCATING STORED ENTRIES IN AN ELECTRONIC TELEPHONE DIRECTORY

(57) Abstract

A method for locating stored entries in an electronic directory, said directory containing a plurality of entries each comprising a name field and an associated telephone and/or telefax number field, comprises the steps of receiving information concerning a predefined number of characters of a name, identifying all entries in said directory whose name fields match said information, and, if more than one entry has been identified, receiving further information to select a single entry from the identified entries. A communication apparatus is adapted to perform this method. The method and apparatus of the invention enable a user of a telephone to easily find stored entries in an electronic directory.



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COMMUNICATION APPARATUS AND METHOD FOR LOCATING STORED ENTRIES IN AN ELECTRONIC TELEPHONE DIRECTORY

The invention concerns a method for locating stored entries in an electronic directory and a communication apparatus. The method may be performed by any type of communication apparatus, which comprises telephones, facsimile machines, computers, electronic organizers and other devices. The method is especially suited to be incorporated in telephones of all kinds, such as mobile telephones, office desk phones, private branch exchange operator consoles and so on.

The devices mentioned above typically comprise an electronic directory in which a plurality of entries is stored. Each entry contains the name of a person or institution, associated telephone and/or telefax numbers and possibly further information.

It is known to access such an electronic directory by entering a name of a person or institution to be called. This name is then searched automatically in the directory, and the corresponding telephone and/or telefax numbers are indicated and may be dialled. This method, however, is quite inconvenient since the exact name must be entered. This is error-prone and does not yield a result if the user does not remember the name exactly. Furthermore, the name to be entered may be quite long, such that a considerable amount of typing may be involved.

It is also known display the complete list of entries in the directory. The user may scroll through the list and may select an appropriate entry using cursor keys. This method is not suitable if many entries are stored in the directory.

Consequently, the invention has the objective to solve the above-mentioned problems and to provide means which enable a user to easily find stored entries in an electronic directory.

This objective is solved by a method having the features of claim 1 and by a communication apparatus having the features of claim 11. The term "name" as used herein is to be interpreted as comprising all kinds of information which may serve to identify a person, institution or any other entity to be called. A name may comprise several parts, e.g. a first name, a last name, a title, and so on. Correspondingly, the name field may be divided into subfields for storing these parts. During the identification step, the entered information may be matched to all subfields of the name fields or only to a selected subset thereof.

The inventive method and apparatus allow the user to search and find a desired entry in the database even if only information concerning a part of the name to be called is entered. This is very convenient. The user may search for names which he does not remember completely. Only very few keypresses are required.

In preferred embodiments, the information entered initially by the user corresponds to one, two, three or four characters of the name to be searched. As soon as this predetermined amount of information is entered, it is preferably determined whether an entry in the directory is uniquely specified.

If there are multiple matches, they are preferably shown to the user, who may scroll through the list and select the correct one manually. In other preferred embodiments, the user may be prompted to enter further information about the searched entry, in particular information about further characters in the name field. These two approaches may also

be combined by giving the user the choice of entering further information or selecting one of the currently shown entries.

In order to enter information about the searched entry, the user preferably presses keys on a numeric keypad. Each of these keys may correspond to one digit and a predefined set of characters. For example, one key may be labelled "8TUV" and may match the characters "T", "U" and "V" in an entry of the directory.

Further preferred embodiments of the invention are recited in the dependent claims.

Several sample embodiments of the invention will now be described in more detail with reference to the drawings, in which:

Fig. 1 shows a block diagram of a telephone apparatus according to the present invention,

Fig. 2 shows a flow diagram according to a first embodiment of the method of the invention, and

Fig. 3 shows a flow diagram according to a second embodiment of the method of the invention.

The method of the invention can be performed using any communication apparatus which has a display, a keyboard and a suitable control unit for storing and maintaining a directory. The keyboard may be a numeric keypad. In the sample embodiments described herein, a GSM mobile telephone is employed. The telephone is shown in Fig. 1. It includes a high frequency unit 10 for sending and receiving radio frequency over an antenna 12, and an audio frequency unit 14 coupled to the high frequency unit 10 as well as to a speaker 16 and a microphone 18. A processing unit 20 is

coupled to the high frequency unit 10, the audio frequency unit 14, a memory 22, a numeric keypad 24, a visual LCD display 26 and a ring tone generator 28. On each key of the keypad 24, one digit and three characters of the alphabet are indicated. In other words, a key indication, which signifies that a certain key on the numeric keypad 24 has been pressed, will match any of the characters indicated on the key.

The directory is stored in the memory 22. It contains a plurality of entries, each having a name field and an associated telephone number field. Each name field is divided into two subfields for holding a first name and a last name, respectively. The following table gives an example of such a directory, which will be used in the subsequent description:

first name	last name	telephone #
SAM	WHITE	09876-54321
TONY	WHITLEY	01234-56789
...	...	...

In the telephone shown in Fig. 1, the numeric keypad 24, the processing unit 20 and the memory 22 form means for receiving information concerning a predefined number of characters of a name and means for receiving further information to locate a single entry from a set of identified entries. The processing unit 20 and the memory 22 form identifying means for identifying entries in the directory stored in the memory 22. The processing unit 20, the memory 22, the keypad 24 and the display 26 together form means for locating stored entries in the directory.

In a first sample embodiment of the method of the present invention, which is shown in Fig. 2, exactly three keys on the keypad 24 are pressed in order to provide information

concerning the first three letters of the first name subfield or the last name subfield. The corresponding key indications are received (box 30) and the directory is searched for entries with matching name fields (box 32). It is then determined whether an entry has been uniquely identified (box 34). If this is the case, the telephone number stored in this entry is dialled either automatically or by pressing a special dialling key or by selecting an appropriate menu option (box 40).

For example, pressing the keys labelled "8TUV", "6MNO" and "6MNO" in this order will uniquely match the character sequence "TON" in the first name field and will cause the number 01234-56789 to be recalled and dialled. If the entry "SAM WHITE" was not present in the sample directory, pressing the key sequence "9WXY", "4GHI" and "4GHI" would also recall the number 01234-56789 since this sequence would uniquely match "WHI" in the last name field.

In the sample directory shown above, however, pressing the key sequence "9WXY", "4GHI" and "4GHI" will match both entries. This is not very likely in a small directory, but it may happen. As a result, the two matching names (and any other matching names which may have been found in the directory) are shown on the display 26 (box 36). The user may scroll through these names using the cursor keys of the telephone, and may select the correct name by pressing an enter key (box 38). The number associated with this name is then dialled in the way described above (box 40).

Instead of scrolling through the list, the user may also press further digit keys to enter information about the subsequent characters of the names. After each further keypress, the list of matching names is updated by the telephone. The user may continue typing further digit keys until an entry is uniquely identified, or he may at any point decide to select one of the shown entries manually.

In an alternative embodiment, which is especially suited for telephones with small displays, no list of matching names is shown if the name has not yet been uniquely identified. Instead, the user receives an indication that further information, i.e. further keypresses, are necessary in order to fully identify the name. The method of this embodiment is shown in Fig. 3, in which boxes 30, 32, 34 and 40 are the same as described above. Box 42 signifies the pressing of one further key. Box 44 denotes a searching process similar to that of box 32 with the exception that all information entered so far by the user is taken into account.

In further alternative embodiments, the number of keys to be pressed before the search commences is different from three. In particular, this number may be one. Then a list of matching names is shown and updated after every single keypress.

In yet further alternative embodiments, it may be necessary to start the searching process by some special action, for example by pressing a key labelled "RECALL" or by choosing a corresponding menu item. This may be necessary because the search may be quite slow when a large database has to be inspected by a limited capacity processor.

The "RECALL" key may also be used to distinguish dialling a number from accessing the directory. For example, the key sequence "9WXY", "4GHI" and "4GHI" may either signify that the user wants to dial the telephone number 944, or that he wants to search for a directory entry. Consequently, the user may be required to press either a "DIAL" key or the "RECALL" key after entering the above key sequence such that the appropriate action can be performed.

In alternative embodiments, the telephone can be put into a search mode by pressing the "RECALL" key before entering the search term. For example, the key sequence "RECALL", "9WXY",

"4GHI" and "4GHI" may be used to initiate a search. This special search mode is especially useful if the list of results is updated in response to every single keypress.

Claims

1. A method for locating stored entries in an electronic directory, said directory containing a plurality of entries each comprising a name field and an associated telephone and/or telefax number field, said method comprising the steps of:

a) receiving information concerning a predefined number of characters of a name,

b) identifying all entries in said directory whose name fields match said information, and

c) if more than one entry has been identified in step b), receiving further information to locate a single entry from the identified entries.

2. The method of claim 1, wherein said predefined number of characters in step a) is one, two, three or four.

3. The method of claim 1 or 2, wherein, if more than one entry has been identified in step b), at least some of the identified entries are displayed to a user, and wherein said further information received in step c) comprises information regarding the selection of one of the displayed entries by the user.

4. The method of one of claims 1 to 3, wherein, if more than one entry has been identified in step b), the following substeps of step c) are performed:

c1) receiving further information concerning a predefined number of further characters of said name,

c2) identifying all entries in said directory whose name fields match all the information received so far.

5. The method of claim 4, wherein steps c1) and c2) are repeated until one entry in said directory is uniquely determined.

6. The method of claim 4 or 5, wherein said predefined number of further characters in step c2) is one.

7. The method of one of claims 1 to 6, wherein said information received in step a) and/or in step c1) comprises a plurality of key indications, each key indication corresponding to one character of said predefined number of characters.

8. The method of claim 7, wherein each key indication matches a set of characters.

9. The method of claim 8, wherein each key indication corresponds to a keypress on a numeric keypad.

10. The method of one of claims 1 to 9, wherein the user is prompted to enter further information as long as more than one entry in said directory is identified in step b) and/or in step c2).

11. A communication apparatus, in particular a telephone apparatus, comprising means for locating stored entries in an electronic directory, said directory containing a plurality of entries each comprising a name field and an associated telephone and/or telefax number field, said apparatus comprising:

- means for receiving information concerning a predefined number of characters of a name,
- identifying means for identifying all entries in said directory whose name fields match said information, and
- means for receiving further information to locate a single entry from the identified entries, if more than one entry has been identified by said identifying means.

12. The apparatus recited in claim 11, characterized in that said apparatus further comprises means for performing the method recited in one of claims 2 to 10.

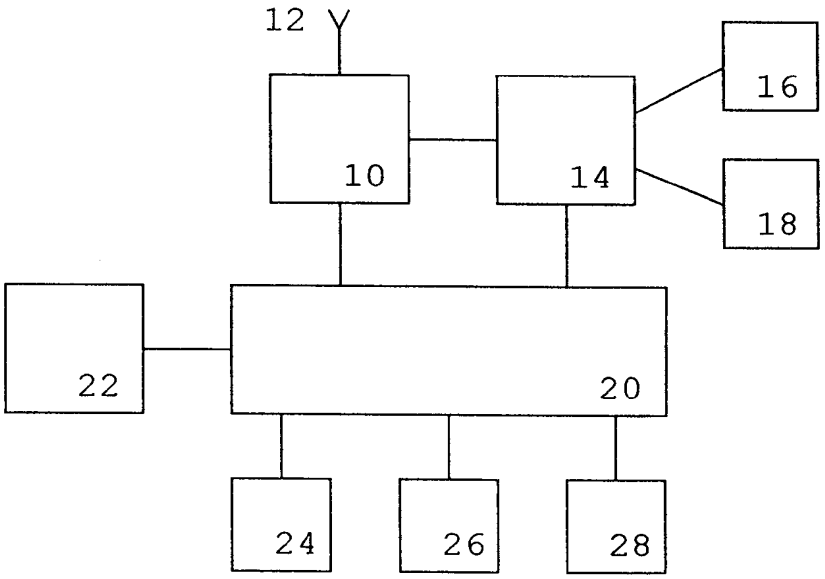

Fig. 1

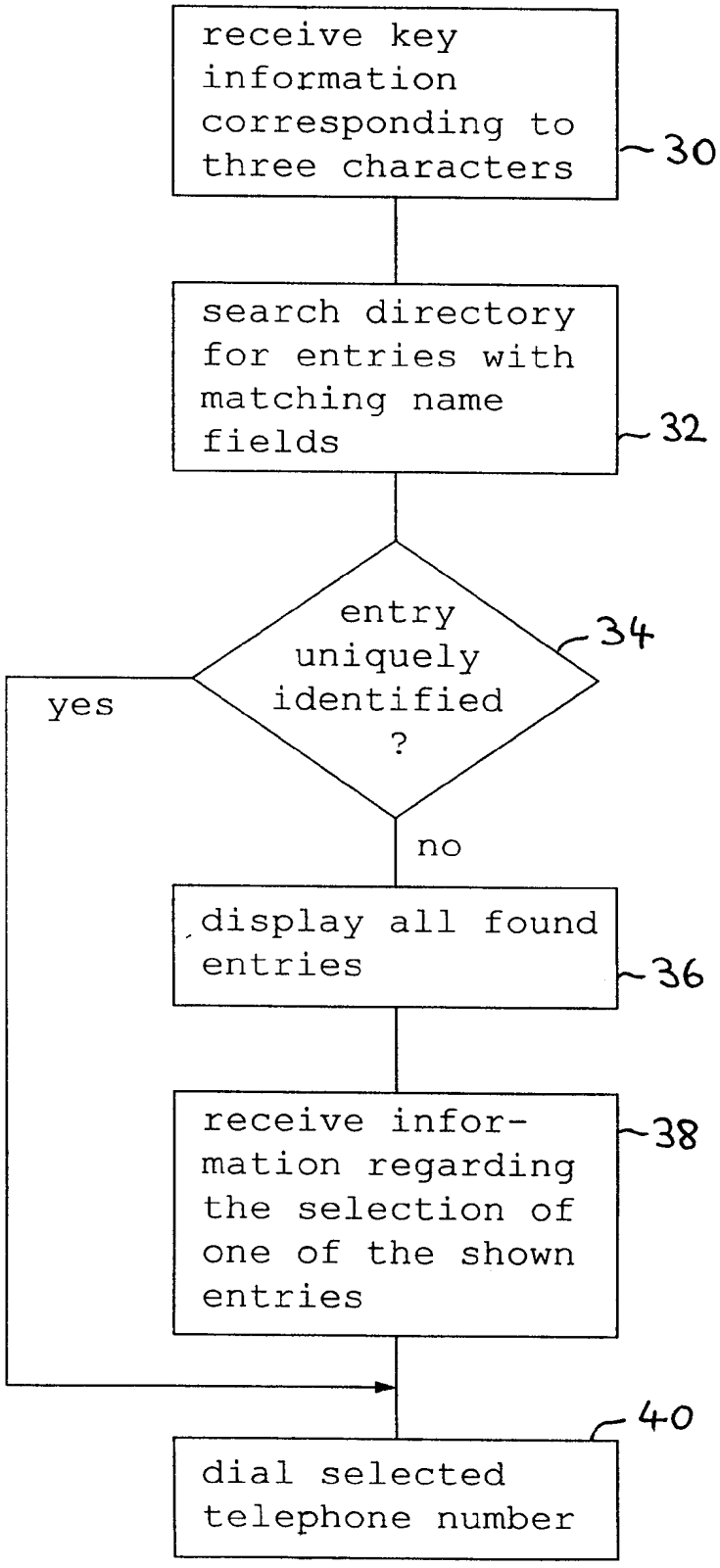
receive key information corresponding to three characters
30
search directory for entries with matching name fields
32
entry uniquely identified ?
34
yes
no
display all found entries
36
receive information regarding the selection of one of the shown entries
38
dial selected telephone number
40

Fig. 2

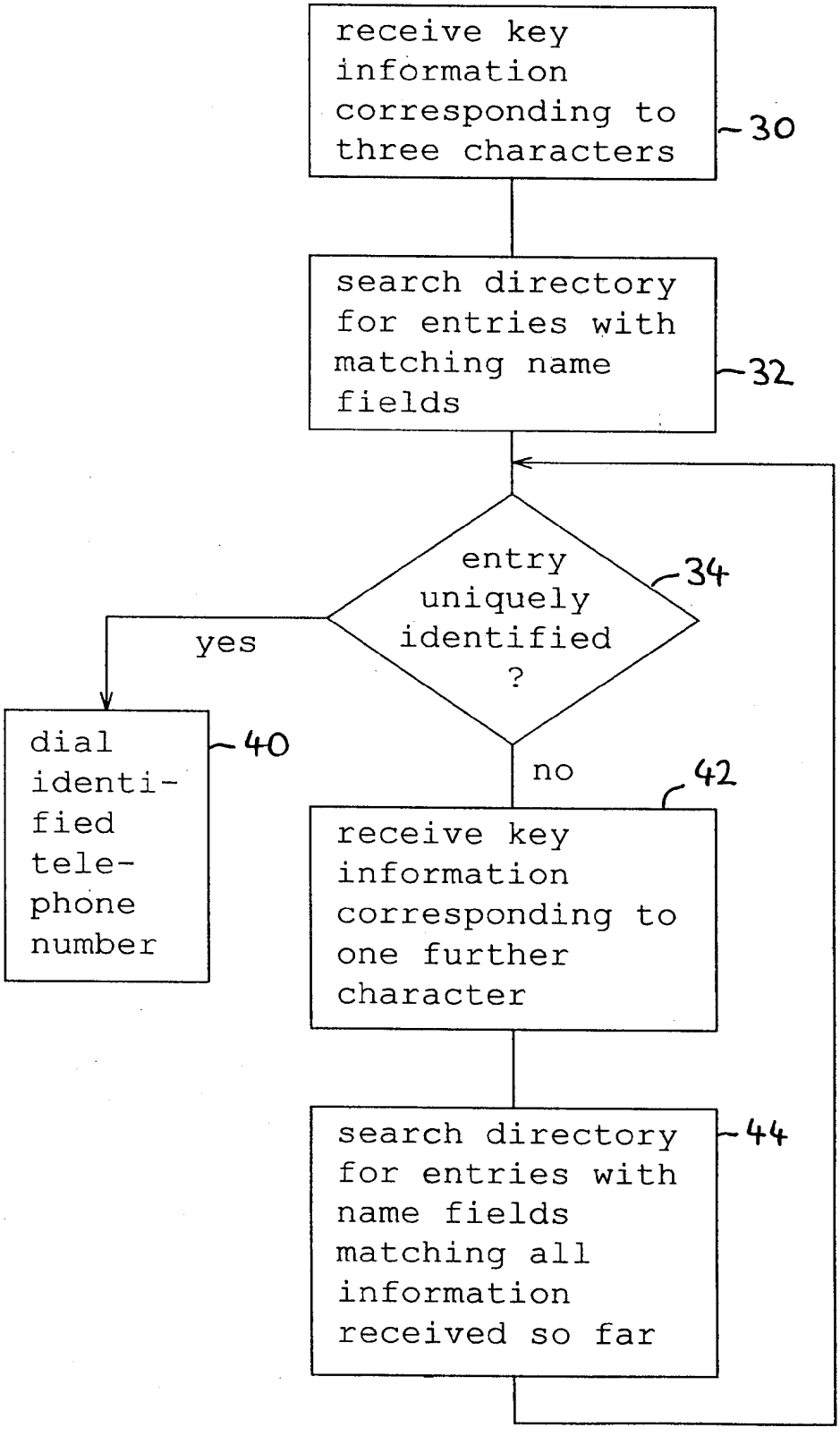
receive key information corresponding to three characters
30
search directory for entries with matching name fields
32
entry uniquely identified ?
34
yes
no
dial identi-fied tele-phone number
40
receive key information corresponding to one further character
42
search directory for entries with name fields matching all information received so far
44

Fig. 3

INTERNATIONAL SEARCH REPORT

Inte ,onal Application No
PCT/GB 97/02226

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H04M1/274

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	RUIZ A: "VOICE AND TELEPHONY APPLICATIONS FOR THE OFFICE WORKSTATION" PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON COMPUTER WORKSTATION, SAN JOSE, CALIFORNIA, NOVEMBER 11 - 14, 1985, no. CONF. 1, 11 November 1985, INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, pages 158-163, XP002029811 see on page 160 paragraph: "Tele" - Directory based autodial. ---	1-12
X	US 4 341 929 A (ALEXANDER RICHARD D ET AL) 27 July 1982 see column 2, line 5 - column 3, line 36 see column 3, line 57 - column 4, line 11 see figures 1,3,4 --- -/--	1-12

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
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Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 120 477 A (SIEMENS AG) 3 October 1984 see page 4, line 20-32 see page 5, line 16-37 see page 8, line 13-23 see figures 1,2	1-3,7,8, 10-12
X	GB 2 266 797 A (NOKIA MOBILE PHONES UK ;NOKIA MOBILE PHONES LTD (FI)) 10 November 1993 see page 10, line 22 - page 12, line 11; figure 3 see abstract	1-12
X	EP 0 457 077 A (ROLM SYSTEMS) 21 November 1991 see column 2, line 26 - column 3, line 24; figures 1,2	1-12
X	EP 0 567 333 A (NIPPON ELECTRIC CO) 27 October 1993 see abstract; figure 3	1,12

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

Inte onal Application No
PCT/GB 97/02226

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4341929 A	27-07-82	EP 0047782 A	24-03-82
		WO 8102824 A	01-10-81
EP 0120477 A	03-10-84	DE 3310964 A	04-10-84
GB 2266797 A	10-11-93	EP 0570116 A	18-11-93
EP 0457077 A	21-11-91	NONE	
EP 0567333 A	27-10-93	JP 6046121 A	18-02-94
		AU 3713093 A	28-10-93
		CA 2094547 A,C	24-10-93
		KR 9608330 B	24-06-96
		US 5467392 A	14-11-95